

What is claimed is:

1. A system adapted for use in an ear having an ear canal, comprising:
a first microphone adapted for use in the ear canal, the first microphone
5 receiving an occluded sound from about the ear canal;
a processor, connected to the first microphone, to process the occluded sound;
a wireless transmitter, connected to the processor, to receive the processed
occluded sound from the processor and transmit a first wireless signal representing the
occluded sound; and
10 an earmold housing the first microphone, the processor, and the wireless
transmitter, the earmold configured for use as an in-the-ear (ITE) device.
2. The system of claim 1, further comprising:
a wireless receiver, connected to the processor, to receive a second wireless
15 signal representing a remote sound; and
a speaker connected to the processor, the speaker adapted for use in the ear
canal,
wherein:
the processor further processes the remote sound, and the speaker is
20 adapted to transmit the processed remote sound to the ear canal; and
the earmold further houses the wireless receiver and the speaker.
3. The system of claim 2, wherein the first microphone and the speaker include
one common device receiving the occluded sound and transmitting the processed
25 remote sound.
4. The system of claim 2, further comprising a second microphone connected to
the processor, the second microphone adapted to receive an ambient sound from
outside the ear canal, and wherein:
30 the first processor further processes the ambient sound; and

the speaker is configured to transmit the processed second and ambient sounds to the ear canal.

5 5. The system of claim 2, further comprising a voice operated exchange (VOX) circuit connected to the processor.

6. The system of claim 5, wherein the VOX circuit comprises an occluded sound gating module, coupled to the first microphone, to blank or substantially attenuate the occluded sound.

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7. The system of claim 6, wherein the VOX circuit further comprises a remote sound gating module, coupled to the wireless transceiver, to blank or substantially attenuate the remote sound.

15 8. The system of claim 6, further comprising a second microphone connected to the processor, the second microphone adapted to receive an ambient sound from outside the ear canal, and wherein:

the first processor further processes the ambient sound; and

20 the speaker is configured to transmit the processed second and ambient sounds to the first ear canal,

wherein the VOX circuit comprises an ambient sound gating module, coupled to the first microphone, to blank or substantially attenuate the ambient sound.

25 9. The system of claim 2, wherein the processor comprises a speech recognition module.

10. The system of claim 2, wherein the earmold is configured for use as an in-the-canal (ITC) device.

11. The system of claim 10, wherein the earmold is configured for use as a completely-in-the-canal (CIC) device.
12. The system of claim 2, further comprising a remote device communicatively
5 coupled to the wireless transmitter and the wireless receiver via a telemetry link providing for simultaneous bi-directional communication.
13. The system of claim 12, wherein the remote device comprises at least one of a computer, a personal digital assistant (PDA), a cellular phone, a walkie talkie, or a
10 language translator.
14. A system adapted for use in and about an ear having an ear canal, comprising:
an in-the-ear (ITE) module including a first microphone adapted for use in the ear canal, the first microphone receiving an occluded sound from about the ear canal;
15 and
a behind-the-ear (BTE) module attached to the ITE module, the BTE module including:
a processor, connected to the first microphone, to process the occluded sound; and
20 a wireless transmitter, connected to the processor, to receive the processed occluded sound from the processor and transmit a first wireless signal representing the occluded sound.
15. The system of claim 14, wherein the ITE module further comprises a speaker
25 adapted for use in the ear canal, the speaker transmitting a remote sound to the ear canal, and the BTE module further comprises a wireless receiver to receives a second wireless signal representing the remote sound, wherein the speaker and the wireless receiver are connected to the first processor, which further processes the remote sound.

16. The system of claim 15, wherein the first microphone and the speaker include one common device receiving the occluded sound and transmitting the processed remote sound.

5 17. The system of claim 15, wherein the BTE module comprises a second microphone connected to the processor, the second microphone adapted to receive an ambient sound from outside the ear canal, and wherein:
the processor further processes the ambient sound; and
the speaker is configured to transmit the processed second and ambient sounds
10 to the ear canal.

18. The system of claim 15, wherein the BTE module comprises a voice operated exchange (VOX) circuit.

15 19. The system of claim 18, wherein the VOX circuit comprises an occluded sound gating module, coupled to the first microphone, to blank or substantially attenuate the occluded sound.

20. The system of claim 19, wherein the VOX circuit further comprises a remote
20 sound gating module, coupled to the wireless transceiver, to blank or substantially attenuate the remote sound.

21. The system of claim 19, wherein the BTE module comprises a second
microphone connected to the processor, the second microphone adapted to receive an
25 ambient sound from outside the ear canal, and wherein:
the first processor further processes the ambient sound; and
the speaker is configured to transmit the processed second and ambient sounds
to the first ear canal, and
wherein the VOX circuit comprises an ambient sound gating module, coupled
30 to the first microphone, to blank or substantially attenuate the ambient sound.

22. The system of claim 15, wherein the processor comprises a speech recognition module.
23. The system of claim 15, wherein the BTE module comprises a rechargeable
5 battery.
24. The system of claim 15, further comprising a remote device communicatively coupled to the wireless transmitter and the wireless receiver via a telemetry link providing for simultaneous bi-directional communication.
- 10 25. The system of claim 24, wherein the remote device comprises at least one of a computer, a personal digital assistant (PDA), a cellular phone, a walkie talkie, or a language translator.
- 15 26. A system adapted for use in a first ear having a first ear canal and a second ear having a second ear canal, comprising:
a first ear-level device including:
a first microphone adapted for use in the first ear canal, the first
microphone receiving an occluded sound from about the first ear canal;
20 a first processor, connected to the first microphone, to convert the occluded sound to a first electrical signal; and
a wireless transmitter, connected to the first processor, to receive the first electrical signal and transmit a first wireless signal representing the occluded sound; and
25 a second ear-level device including:
a wireless receiver to receive a second wireless signal representing a remote sound;
a second processor, connected to the wireless receiver, to convert the second wireless signal to the remote sound; and
30 a speaker connected to the second processor, the speaker adapted for

use in the second ear canal to transmit the remote sound to the second ear canal.

27. The system of claim 26, wherein the second ear-level device further comprises
5 a second microphone connected to the second processor, the second microphone adapted to receive an ambient sound from outside the second ear canal, and wherein:
the second processor further processes the ambient sound; and
the speaker is configured to transmit the remote sound and the processed ambient sound to the first ear canal.

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28. The system of claim 26, wherein the first ear-level device further comprises a first voice operated exchange (VOX) circuit connected to the first processor, and the second ear-level device further comprises a second VOX circuit connected to the second processor,

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29. The system of claim 26, wherein the first processor and the second processor each comprise a speech recognition module.

30. The system of claim 26, wherein the first and second ear-level devices are each
20 an behind-the-ear (BTE) device.

31. The system of claim 26, wherein the first and second ear-level devices are each an in-the-ear (ITE) device.

25 32. The system of claim 26, wherein the first and second ear-level devices are each an in-the-canal (ITC) device.

33. The system of claim 32, wherein the first and second ear-level devices are each an completely-in-the-canal (CIC) device.

34. The system of claim 26, further comprising a remote device communicatively coupled to the first and second ear-level devices.

35. The system of claim 34, wherein the remote device comprises at least one of a computer, a personal digital assistant (PDA), a cellular phone, a walkie talkie, or a language translator.

36. A method, comprising:
 detecting an occluded sound using a first microphone adapted for use in an ear canal;
 detecting an incoming radio signal representing a remote sound from the remote device;
 starting a voice operated exchange (VOX) housed within an ear-level communication device when at least one of the occluded sound and the incoming radio signal is detected if the VOX is not already on, the ear-level communication device being one of an in-the-ear (ITE) device and a behind-the-ear (BTE) device;
 gating the occluded sound on, and gating the remote sound off, when the occluded sound is detected while the incoming radio signal is not detected; and
 gating the remote sound on, and gating the occluded sound off, when the incoming radio signal is detected while the occluded sound is not detected.

37. The method of claim 36, wherein detecting the occluded sound comprises comparing an amplitude of the occluded sound to an occluded sound threshold, wherein the occluded sound is detected when the amplitude of the occluded sound exceeds the occluded sound threshold.

38. The method of claim 37, wherein detecting the incoming radio signal comprises comparing an amplitude of the remote sound to a remote sound threshold, wherein the incoming radio signal is detected when the amplitude of the remote sound exceeds the remote sound threshold.

39. The method of claim 36, further comprising detecting an ambient sound using a second microphone, and wherein starting the VOX comprises starting the VOX when at least one of the occluded sound, the incoming radio signal, and the ambient sound is detected if the VOX is not already on.

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40. The method of claim 39, furthering comprising gating the occluded sound off, gating the remote sound on, and gating the ambient sound off, when the incoming radio signal is detected while the occluded sound is not detected.

10 41. The method of claim 39, furthering comprising gating the occluded sound off, gating the remote sound on, and gating the ambient sound on, when the incoming radio signal is detected while the occluded sound is not detected.

15 42. The method of claim 39, furthering comprising gating the occluded sound on, gating the remote sound off, and gating the ambient sound off, when the occluded sound is detected while the incoming radio signal is not detected.